

Message

From: Pennington, Michael (DEQ) [PENNINGTONM@michigan.gov]
Sent: 4/12/2018 12:03:25 PM
To: Burdick, Melanie [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=bc0fae2c6b7a43ec8b577d3689229aea-MHaveman]
CC: Fish, Kim (DEQ) [FISHK@michigan.gov]
Subject: FW: Back Forty Working Wetland Water Budget Model Documents
Attachments: Hydrograph calculations WL-40-41 (existing v2).xls; Hydrograph calculations WL-40-41 (operating at wetland fringe).xls; Hydrograph calculations WL-40-41 (operating v2).xls; Hydrograph calculations WL-40-41 (existing at wetland fringe).xls; tnwrap05-2.pdf

Good Morning Melanie,

Attached are the hydrographs I prepared after discussion with Jeff earlier this week. The hydrographs they prepared in response to our last face to face meeting (the one you were on the phone for) still had a significant contribution from runoff which I disagree with based on site conditions. Let me know if you have any questions.

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From: Pennington, Michael (DEQ)
Sent: Wednesday, April 11, 2018 11:27 AM
To: 'Nimmer, Mike' <Mike.Nimmer@Foth.com>
Cc: 'Donald Tilton' <dtilton48@sbcglobal.net>; Jeff King <jking@king-macgregor.com>; Donohue, Steve <Steve.Donohue@Foth.com>; Wilson, Kristina (DEQ) <WilsonK17@michigan.gov>
Subject: RE: Back Forty Working Wetland Water Budget Model Documents

Mike and others,

So here are a few scenarios that I came up with using the Pierce Model and groundwater data:

1. Hydrograph Calculations (existing and operating v2)—I ran these models using the assumption that snowmelt filled up the wetland to 11.75 inches in April. After that TR-55 is applied using a RCN of 60 so only one rainfall event in November produced runoff (2.1 inch event). This resulted in 2.88 inches of input into the wetland under existing conditions and 1.75 inches under operating due to reduced watershed. For the existing conditions model I input groundwater based on monitoring well information for PZ-23A. The operating conditions does not have standing water under the assumption that this wetland is groundwater fed and water levels are being reduced by 2 feet. Under that scenario infiltration rates apply between June and October.
2. Hydrograph Calculations (existing and operating at wetland fringe)—I ran these models for the wetland fringe (i.e. saturated conditions) with no standing water (no groundwater input). The assumption I made for existing conditions is that the soil is saturated April-September so there isn't any infiltration during those months. The only month with infiltration is October when water levels drop (based on well data you provided). Under the operating scenario infiltration rates apply because the water is drawdown 2 feet. Also, there isn't the 11.75 inch input for runoff because its at the wetland fringe and conditions are saturated (but the wetland did fill up based on snow melt).

As you can see the hydrographs for each scenario between existing and operating are quite different. At the location of well the area may still be wetland but it may transition to a different type. At the fringe you are likely losing wetland

area due to reduction in water levels caused by lowering of the groundwater table. Based on the runoff curve number of the watershed feeding the wetland and the assumed infiltration rate I see the wetland functioning similar to what these hydrographs show under existing and operating conditions. That being said if infiltration rates are much lower than what we assumed (which I doubt they are for this wetland based on soil boring logs at well locations) there could be less impact from lowering of groundwater. Also, there is less likely impact as you move beyond the .5' drawdown contour (assuming that groundwater model is accurate).

I did also want to make a comment with regards to installation of the monitoring wells. Since the wells were installed as piezometers and not true monitoring wells (we specify USACE 2005 method for monitoring well installation—see attached) the groundwater elevations in the wells are going to read higher than actual water levels in the wetland. This is likely why when they installed the wells in June they had saturated conditions and not standing water. Do you know if the individuals reading the wells took manual readings outside of the well casings (next to the wells) to verify water levels?

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From: Nimmer, Mike <Mike.Nimmer@Foth.com>
Sent: Wednesday, April 11, 2018 9:53 AM
To: Pennington, Michael (DEQ) <PENNINGTONM@michigan.gov>
Cc: 'Donald Tilton' <dtilton48@sbcglobal.net>; Jeff King <jking@king-macgregor.com>; Donohue, Steve <Steve.Donohue@Foth.com>
Subject: RE: Back Forty Working Wetland Water Budget Model Documents

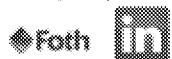
Mike,

Attached are the well construction logs for the four piezometers in WL-40/41. In addition, I added a few columns of well construction details to the historical water level spreadsheet that I sent you late yesterday.

Let me know if you have any further questions. Thanks!

Mike

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From: Pennington, Michael (DEQ) [mailto:PENNINGTONM@michigan.gov]
Sent: Wednesday, April 11, 2018 7:56 AM
To: Nimmer, Mike <Mike.Nimmer@Foth.com>
Cc: 'Donald Tilton' <dtilton48@sbcglobal.net>; Jeff King <jking@king-macgregor.com>; Donohue, Steve <Steve.Donohue@Foth.com>
Subject: RE: Back Forty Working Wetland Water Budget Model Documents

Thanks Mike. Can you provide me with details on well construction also for the 4 wells?

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From: Nimmer, Mike <Mike.Nimmer@Foth.com>
Sent: Tuesday, April 10, 2018 9:11 PM
To: Pennington, Michael (DEQ) <PENNINGTONM@michigan.gov>
Cc: 'Donald Tilton' <dtilton48@sbcglobal.net>; Jeff King <jking@king-macgregor.com>; Donohue, Steve <Steve.Donohue@Foth.com>
Subject: RE: Back Forty Working Wetland Water Budget Model Documents

Mike,

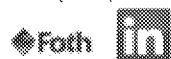
It was good to chat earlier today on the water balance modeling – thanks again for taking the time. Per that conversation, attached are the water elevation data and the soil boring logs for the PZ-22 and PZ-23 nests located in wetland WL-40/41.

Please get back to me if you have any questions or are in need of any other data at this time. Thanks again, and we're looking forward to continuing this discussion in the coming days.

Regards,

Mike

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From: Pennington, Michael (DEQ) [mailto:PENNINGTONM@michigan.gov]
Sent: Tuesday, April 10, 2018 8:34 AM
To: Jeff King <jking@king-macgregor.com>
Cc: 'Donald Tilton' <dtilton48@sbcglobal.net>; Nimmer, Mike <Mike.Nimmer@Foth.com>; Wilson, Kristina (DEQ) <WilsonK17@michigan.gov>
Subject: RE: Back Forty Working Wetland Water Budget Model Documents

Jeff and others,

In preparation for the meeting this afternoon I looked over the water budgets for Wetland 40/41 and have a few questions/comments:

1. On the site information page the piezometer data shows water levels dropping 13 inches in 14 day period (October 12-26). Do you guys no the reason for this drop?
2. With regards to surface runoff my comments on using TR-55 was with reference to how it handled runoff for months when there was snowfall only. We can discuss it this afternoon but I don't think the approach of using a runoff value for the Menominee River Watershed is appropriate since we are looking at individual wetland watersheds.
3. Do you have soil boring information in any of the wetlands that the water budgets were produced for?

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From: Jeff King <jking@king-macgregor.com>
Sent: Friday, April 6, 2018 4:19 PM
To: Pennington, Michael (DEQ) <PENNINGTONM@michigan.gov>
Cc: 'Donald Tilton' <dtilton48@sbcglobal.net>; 'Nimmer, Mike' <Mike.Nimmer@Foth.com>; Fish, Kim (DEQ) <FISHK@michigan.gov>; Seidel, Teresa (DEQ) <SEIDELT@michigan.gov>; Wilson, Kristina (DEQ) <WilsonK17@michigan.gov>; 'dennis donohue' <ddonohue@wnj.com>; 'Donohue, Steve' <Steve.Donohue@Foth.com>; 'David Anderson' <danderson@aquilaresources.com>; 'Burdick, Melanie' <Burdick.Melanie@epa.gov>
Subject: Back Forty Working Wetland Water Budget Model Documents

Hi Mike --

Please see below and attached wetland water balance information with respect to the proposed Back Forty project. We are providing you with a modified version of the wetland water budget model that you provided to us last week, so that we might discuss the attached results with you at your earliest convenience. For right now, we are sending in this email, and one to follow, those water balance spreadsheets for Wetland 40/41 and what we are calling the "Wetland C1 Lobe". There are more spreadsheets in the works to address the remaining wetlands, but for now we thought it best to start with these two drafts, and in so doing, consider them as examples that we could use to evaluate the remaining wetlands associated with this proposed project. In addition, we are including Mike Nimmer's email below, so that hopefully it also might assist you in your review, as you will read some of the logic that he and Don Tilton put into the development of these materials over the past week or so.

I will be attempting to contact you Monday morning (April 9) in an effort to schedule a time when we could meet or have a conference call early in the week to go over our work on this matter since we last spoke, and then move forward with the additional necessary assessments for each wetland. Thank you for your attention to this matter.

Jeff

From: Nimmer, Mike
Sent: Tuesday, April 03, 2018 4:48 PM
To: 'Donald Tilton' <dtilton48@sbcglobal.net>
Cc: Jeff King <jking@king-macgregor.com>;
Subject: RE: Status

Don,

Attached is a revised MDEQ water balance model for WL-A1/A3 Property (for existing conditions). I've been using this wetland scenario to make the revisions we discussed with Mike Pennington; once we all agree to the revisions, we'll apply this model to the other wetlands (for existing and operating conditions). Note that I was careful not to add/subtract rows/columns, so that we could easily compare it with the original model, and to facilitate cut/paste functions should we chose to re-insert logic from the original worksheet. Below is a summary of the revisions, organized by tab:

- Site Information
 - I updated the drainage area calculation to subtract the wetland area. After further review of the way their calculations are set up, the precipitation on the wetland would have been double-counted without this change.
- Climate Log
 - I added the winter correction that we discussed. As a refresher, we discussed summing Dec-Mar precipitation, and adding it evenly in the month of April (like we did in the Foth model). As I recall, Mike P was okay with that revision, per our discussion last week. Note that I added the revisions in multiple, hopefully transparent, steps in columns J – T, which should facilitate a relatively easy change should we choose to.
- Infiltration
 - I didn't change anything yet regarding these calculations. However, you'll see that I added some other (and in my mind, more credible) infiltration rate options in column L. You'll notice that while the other rates are quite a bit lower than the one Mike P provided, we can easily insert these (or others) into cell D15 as a sensitivity analysis (the model is definitely sensitive to this parameter).
- Groundwater
 - I didn't change anything yet regarding these calculations. Per our discussion, we were going to keep this blank for now to see what our water balance looks like without the groundwater contribution (Mike P also agreed with that approach as a first cut). Note that I did add the logic to quickly insert groundwater flux values should we want to (into cells E15, F15, & G15).
- Surface Runoff
 - I changed the logic in columns D, I, and N to not use the TR-55 curve number calculation. Per our discussion the other day, I instead scaled the daily runoff precipitation by the total annual runoff value in the USGS Oakes & Hamilton reference for the Menominee River watershed. That reference contained an overland flow value for average conditions (which along with recharge equaled stream flow in their water balance). For wet and dry conditions, overland flow values were not explicitly provided in Oakes & Hamilton; however, the values were parsed out of the streamflow values, which were provided. Note that while Mike P agreed that the model needed revising with regard to the TR-55 calculation and that it was likely under-predicting runoff, we did not discuss the specifics of how we would make the changes (he gave us the green light to give a shot at another approach, should we choose to do so). I think we have a good case with the approach we took, but it will need to be discussed with him.
- Hydrograph
 - I changed the logic in column R so that the water level was not zeroed out at the ground surface. This was a short-coming that you and I identified in the model, and Mike P also recommended that we make this change. Note that I also added a calculation in column S to account for the porosity when the water

level drops below ground. The 'wetland water depth' line that you see on the graph now pulls from column S.

- Note that I also added a check of runoff depth in column B. This calculation in column B is the runoff depth from the watershed on a unit basis (i.e. depth across the watershed); the runoff calculation that they have in column F is $(\text{runoff depth} \times \text{watershed area}) / \text{wetland area}$. I thought it would be good to add column B to distinguish between the two runoff values on this summary page.
- Water Balance Calculator
 - No changes made.
- Appendix
 - No changes made.

Thanks!

Mike

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